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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,890	11/27/2001	Satoru Yamagata	925-219	7689

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EXAMINER

LEE, CALVIN

ART UNIT PAPER NUMBER

2825

DATE MAILED: 03/12/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/993,890

Applicant(s)

YAMAGATA ET AL.

Examiner

Lee Calvin

Art Unit

2825

-- The MAILING DATE of this communication appears on the cover sheet with the correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____ .
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-4 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) ^{1 and} 3-4 is/are rejected.
- 7) Claim(s) 2 is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____ .
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 .

- 4) Interview Summary (PTO-413) Paper No(s). _____ .
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____ .

OFFICE ACTION

Specification

1. The specification is objected to because of the following informality:

Page 1, line 15, replace "10B" with --10C--

Page 2, line 24, before "a source/drain region" delete --the--

Page 18, line 15, replace "Fig. 6A" with --Fig. 6--

Page 18, line 20, replace "films 10, 2." with --films 10 and 11--

Claim Objection

2. Claim 1 is objected to because of the following informality:

Claim 1, lines 1-5, replace "a nonvolatile semiconductor memory wherein memory cells each having a tunnel oxide film, a floating gate, a first insulating film and a control gate stacked in this order are formed in a matrix on a semiconductor substrate" with --nonvolatile semiconductor memory cells formed in a matrix on a semiconductor substrate, wherein each memory cell has a tunnel oxide film, a floating gate, a first insulating film, and a control gate stacked in this order--

Claim Rejections - 35 U.S.C. § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claim 1 is rejected under 35 U.S.C. 102(b) as being anticipated by *Chen et al.* (US 5,482,881).

Chen discloses a method for forming a nonvolatile memory cell, comprising of:

- forming a tunnel oxide film **120**, then a first conductive layer **122** as a floating gate on a substrate
- forming a source/drain region **130** on the substrate by using the first conductive layer as a mask
- forming a first insulating film **124**, then a second conductive layer **126** as a control gate on the first conductive layer [Figs. 4D, 5 and cols. 2, 7-8]
- etching a portion of the tunnel oxide film immediately below a sidewall of the floating gate
- forming a second insulating film **720** over the structure [Fig. 6F]

Since *Chen* teaches nonvolatile memory cells array [Fig. 2] arranged in a matrix on a substrate 116, wherein each memory cell has a cross section in a (1-1) direction shown on Fig. 3, *Chen* inherently teaches that the first and second conductive layers are patterned in stripes extending in either one of the two directions

Claim Rejections - 35 U.S.C. § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Chen et al.* (US 5,482,081) in view of *Hong et al.* (US 5,445,984).

Chen fails to teach that the tunnel oxide is isotropically etched using a fluorinated acid and the second insulating film is formed by CVD. *Hong* teaches or suggests that a insulating layer is formed by CVD [col. 5] and a tunnel oxide 22 is etched by means of HF in wet etch [col. 7].

It would have been obvious to one having ordinary skill in the art to have modified the fabricating method of *Chen* by utilizing CVD process to form an insulating film and wet etch to etch a tunnel oxide because those processes/techniques are notoriously well known in the art either to form an insulating film economically or to etch a tunnel oxide effectively in EPROM formation


Allowable Subject Matter

7. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the independent claim because none of the cited references teaches thermally oxidizing the floating gate sidewall.

Any inquiry concerning this communication from the Examiner should be directed to *Calvin Lee* at (703) 306-5854 from 7:00 to 17:00 (Monday-Thursday). If attempts to reach the examiner by telephone are unsuccessful, Art Unit 2825's Supervisory Patent Examiner *Matthew Smith* can be reached at (703) 308-1323.

Any inquiry relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0596. The fax phones are (703) 872-9318 for regular communications and (703) 872-9319 for After-Final communications.

February 19, 2003


MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
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